# California Department of Water Resources Division of Statewide Integrated Water Management Water Use and Efficiency Branch

# DRAFT PROVISIONAL METHOD 4 FOR CALCULATING URBAN WATER USE TARGETS

Public Release

24 January 2010

In November 2009, water conservation legislation, Senate Bill No. 7 of the 2009-2010 Seventh Extraordinary Session (SBX7 7), was signed into law as part of a comprehensive water legislative package of five bills. This bill addresses both urban and agricultural water conservation. The urban provisions set a goal of achieving a 20 percent statewide reduction in urban per capita water use and direct urban retail water suppliers to set 2020 urban water use targets. The law provides four methods that urban water suppliers may use to determine their 2020 targets. Three of the methods are described in the law. The law provides that the California Department of Water Resources (DWR) develop the fourth target method through a public process. The task to develop the fourth method is designated Project U4 by DWR. The proposed draft Provisional Target Method 4 is described below for public comment.

#### **Background**

The urban conservation provisions of SBX7 7 are incorporated into Part 2.55 of Division 6 of the California Water Code, commencing with Section 10608. All quotations of the Water Code in this report are from sections added by this legislation, unless otherwise noted.

The requirement to develop water use targets applies to urban retail water suppliers that meet a threshold of number of end users or annual volume of potable water supplied. Section 10698.12(p) defines the water suppliers affected:

"Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

An overview is provided below of the process that urban retail water suppliers must follow and the options they have for complying with the legislation. There are more procedures that water suppliers must follow than described in this document. DWR has published *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*, dated October 1, 2010, to guide water suppliers. The final Target Method 4 will be incorporated into a future revision of the methodologies document.

<u>Baseline Water Use.</u> Water suppliers must define a 10-year base (or baseline) period for water use, from which they will develop their 2020 target levels of per capita water use. A supplier can extend its baseline period up to 15 years if the supplier met at least 10 percent of its 2008 measured retail water demand through recycled water. The baseline period must be continuous and end no earlier than 31 December 2004 and no later than 31 December 2010.

<u>Water Use Targets.</u> An urban retail water supplier must set a 2020 urban water use target and a 2015 interim urban water use target. A supplier must adopt one of four methods for developing its 2020 target. Three of these are defined in section 10608.20(b); the fourth has been developed by DWR in accordance with section 10608.20(b)(4). The target methods are described briefly below:

- 1. Method 1: Eighty percent of the urban water supplier's baseline per capita daily water use
- 2. Method 2: The per capita daily water use that is estimated using the sum of the following:
  - a. For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of DWR's 2016 report to the Legislature reviewing progress toward achieving the statewide 20 percent reduction target, this standard may be adjusted by the Legislature by statute.
  - b. For landscape irrigated through dedicated or residential meters or connections, water use efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in section 490 et seq. of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992.
  - c. For commercial, industrial, and institutional (CII) uses, a 10 percent reduction in water use from the baseline CII water use by 2020.
- 3. Method 3: Ninety-five percent of the applicable state hydrologic region target as stated in the state's April 30, 2009, draft 20x2020 Water Conservation Plan.
- 4. Method 4: To be developed by DWR.

Regardless of which of the four methods is adopted by a water supplier, the target may need to be adjusted further to achieve a minimum reduction in water use in accordance with section 10608.22. As required by this section, a supplier must determine a base daily per capita water use for a five-year period as defined. If the five-year baseline water use is more than 100 GPCD, it must compare two values:

- 1. 95 percent of the five-year baseline daily per capita water use and
- 2. the target determined by the target method it adopted from the four methods allowed above.

The 2020 target will be the lower of the two values.

A water supplier shall meet its 2020 urban water use target by December 31, 2020.

An urban retail water supplier must also determine an interim urban water use target, which is the midpoint between the supplier's base daily per capita water use and its 2020 target. A supplier shall meet its interim urban water use target by December 31, 2015.

Water suppliers have some flexibility in setting and revising water use targets:

- A water supplier may set its water use target and comply individually, or as part of a regional alliance.
- The target initially adopted must be reported in a supplier's 2010 urban water management plan (UWMP).
- A water supplier may revise its water use target in its 2015 or 2020 UWMP or in an amended plan.
- A water supplier may change the method it uses to set its water use target and report it in a 2010 amended plan or in its 2015 UWMP. Urban water suppliers are not permitted to change target methods after they have submitted their 2015 UWMPs.

## **Target Method 4 Requirements**

California Water Code section 10608.20 provides the requirements for Target Method 4, including six criteria:

- (b)(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:
  - (A) Consider climatic differences within the state.
  - (B) Consider population density differences within the state.
  - (C) Provide flexibility to communities and regions in meeting the targets.
- (D) Consider different levels of per capita water use according to plant water needs in different regions.
- (E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.
- (F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

Based on this language, a key assumption is that if the fourth method were to be adopted by all urban retail water suppliers, the result would be a 20 percent statewide savings. This criterion is the basic requirement for Target Method 4. A primary assessment of any of the proposed alternatives has been the ability to estimate the statewide cumulative savings to demonstrate that a proposed alternative could satisfy this requirement.

Three additional criteria were considered by DWR in evaluating alternatives for Target Method 4:

1. Different from 3 Specified Methods: That the method be different from the three legislatively defined methods.

- 2. Cost of Data Collection: The cost and expense to collect the data required to implement the method.
- 3. Ease of Implementation: Ease of implementation by the water supplier.

Note that "consider" as used in the above criteria does not mean that the method contain a specific calculation or adjustment for the given factor. It means that the factor must be considered with respect to the proposal using such factors as relevancy, importance, how the factor may be mitigated in other ways, or overall equity. The strengths and weaknesses of each proposed alternative for each of the criteria have been assessed. Salient strengths or weaknesses in any one or more criteria may influence DWR's overall assessment and choice of a methodology.

Regarding the flexibility criterion, paragraph (C) in the section quoted above, the law does not require that water suppliers implement water conservation in the same manner as their targets are determined. Regardless of which method a water supplier selects to establish its 2020 target, the supplier has the flexibility to use any means of water conservation or water recycling to achieve compliance with the target. The methodology used to calculate the target does not govern how the target is met. In this respect, any option DWR adopts for the fourth target method will have the same flexibility. Also, suppliers have the flexibility to choose which of the four target methods to use.

"Provisional" Method. Section 10608.20(d) provides that DWR shall update Target Method 4 in 2014:

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

DWR has added the term "provisional" to the title of the method currently proposed because DWR, in collaboration with stakeholders, expects to make improvements to the method in the update required by the end of 2014. Possible improvements include changes to the landscape area and water loss savings calculations and adjustments to baselines based on 2010 urban water management plan data.

#### Office of Administrative Law Rulemaking Procedures

Section 10608.20(i) directs DWR to develop emergency and regular rulemaking for process water provisions related to water use targets. The Office of Administrative Law (OAL) in reviewing the process water emergency rulemaking informed DWR that the *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* and the forthcoming Target Method 4 were regulatory documents that should be adopted as part of the rulemaking process. OAL recommended that the documents be incorporated by reference into the process water regulations. DWR will be presenting the process water rulemaking to the California Water Commission (CWC) on 16 February 2011with both the Methodologies document and Target Method 4 incorporated by reference.

Documents incorporated by reference into regulations have same legal authority as regulations. Incorporation by reference will not change how water suppliers use the methodologies or Target Method 4 because the Water Code sections 10608.20(b) and (h)(2) direct water suppliers to follow the methodologies and target method developed by DWR. Incorporation by reference will require that both documents go through a formal rulemaking process before any future changes or amendments can be made.

#### **Public Process**

The development of Target Method 4 commenced in February 2010. The development has relied on input from two public listening sessions at the beginning, from a 34-member Urban Stakeholder Committee (USC), and from a U4 Technical Subcommittee of the USC. To date there have been ten USC meetings and five U4 Technical Subcommittee meetings. Discussion documents for all meetings and all written comments received have been posted on DWR's Web site. The Provisional Target Method 4 will be posted and be the subject of two public workshops. After consideration of the public comments and possible revision of the draft Provisional Target Method 4, DWR will present the proposed target method to the California Water Commission (CWC) for approval. The adopted method will be described in a report to the Legislature.

#### **Schedule**

Development of a target method that meets the statutory criteria and is publicly acceptable has been a technical challenge. Data have not been available for several promising proposals. There have been differing expectations regarding the outcomes for the fourth target method. To ensure a method that is technically defensible and responsive to public input, DWR has extended the adoption date until mid-February 2011. The draft method will be released on 24 January, followed by public workshops on January 27<sup>th</sup> and 28th. Before final adoption by DWR, the draft method will be presented to the California Water Commission at its 16 February meeting.

#### **Alternatives Considered**

During the course of development of Target Method 4 seven distinct alternatives have been proposed by either stakeholders or DWR staff and evaluated. The USC and U4 Technical Subcommittee have been the primary forums for discussion. The background information on the alternatives is found mainly on the DWR Web site in the meeting materials for the USC and U4 Technical Subcommittee. Four alternatives were initially formally proposed for consideration. DWR staff provided a preliminary assessment, dated August 23, 2010, of how well these proposals met the evaluation criteria established in the law or by DWR, as described above.

Subsequently, one of the initial four alternatives was retained for continued consideration and a new alternative was proposed. During evaluation of these two alternatives, two hybrid concepts

evolved that incorporated positive elements of the other alternatives. This second round of four alternatives, including the hybrids, was evaluated in an assessment, "Fourth Target Method Preliminary DWR Staff Assessment of Proposed Alternatives," draft dated 16 November 2011. The proposed draft Provisional Target Method 4 is a refinement of one of the hybrid alternatives.

Several challenges were encountered in the development of alternatives or in the evaluation of whether they could meet the evaluation criteria. Challenges that applied to one or more of the alternatives were:

- Data would not be readily available for many water suppliers to be able to use the alternative.
- Data were not available to be able to determine whether an alternative met the primary requirement that an average statewide savings of 20 percent would be achieved by 2020.
- The alternative would not adequately meet the evaluation criteria.
- The alternative was technically flawed.
- The alternative was inconsistent with the requirements in the law.

## **Draft Provisional Target Method 4**

1. Preliminary Data Analysis Using Sample Agencies

A primary criterion for Target Method 4 is that if all applicable urban water suppliers were to adopt this target method, per capita water use would cumulatively be reduced by 20 percent by 2020 from baseline water use.

To evaluate proposed alternatives for Target Method 4, DWR applied the procedures for each alternative to a set of randomly selected urban water suppliers to set targets for each supplier. To determine the statewide baseline water use and the 2020 target water use, data for a random sample of 52 water suppliers were used.

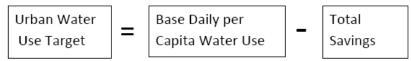
The primary test was whether the average of the 2020 urban water use targets from the sample agencies would be 20 percent lower than the average baseline water use. Based on the timeframe within which suppliers must select their baseline period, DWR has used a 1995-2004 baseline period, with the year 2000 as a midpoint year for baseline for its evaluation of alternatives.

In general, in determining statewide average water use, averages were weighted by water suppliers' service area population, California Urban Water Conservation Council (CUWCC) membership, and hydrologic region. Based on the analysis of the sample agencies, the statewide average water use for 2000 is estimated to have been 192.0 GPCD, which is consistent with other studies. To achieve a 20 percent savings, water use will have to be reduced by 38.4 GPCD to result in total use of 153.6 GPCD.

## 2. Urban Water Use Target

The 2020 water use target for individual urban water suppliers is determined by Equation 1 in units of gallons per capita per day (GPCD).

#### Equation 1



#### 3. Baseline Water Use

Conceptually, to understand the basis of the draft Provisional Target Method 4, baseline water use ("base daily per capita water use" as defined in the law) for individual water suppliers is first divided into five sectors:

- 1. Residential indoor
- 2. Residential outdoor (landscape irrigation)
- 3. Commercial, industrial, and institutional (CII)
- 4. Large landscape
- 5. Water distribution system water losses

"Large landscape" use is deliveries to customers that have water meters dedicated to serving landscape irrigation. These are often large institutional or commercial customers such as parks, school grounds, or cemeteries. It is useful to combine residential outdoor and large landscape sectors because both are influenced by common factors of climate. Water distribution system water losses are often not well documented, especially because many communities in California do not have water meters for all customers. Under the current situation, in order to provide a procedure that is consistent for all water suppliers, it was determined that landscape irrigation and water system losses would be combined into one sector. While technically water losses do not constitute a water use, for simplification of discussion water losses will be referred to as a use.

Again, conceptually, the five baseline water uses described above are recombined into three sectors:

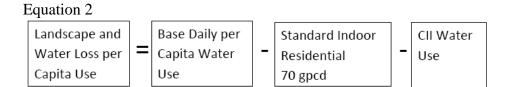
- 1. Residential indoor
- 2. CII
- 3. Landscape use and water loss

Residential water for indoor and outdoor use is delivered through a single water meter. During the development of Target Method 4, various techniques have been analyzed to attempt to separate actual indoor and outdoor residential water use for individual water suppliers. A reliable method could not be developed. Therefore, an assumption is made that standard

residential water use is 70 GPCD, based on a research study. CII water use is commonly measured, even in communities that are not fully metered, because most unmetered water connections serve residential customers.

Since residential landscape water use and water loss are often not measured by water agencies, this equation provides a method for estimation that doesn't require direct measurement.

Within the conceptual framework of the three water use sectors, water suppliers can calculate landscape use and water loss using Equation 2.



## 4. Calculation of Total Savings

The estimate of total water use savings is calculated to correspond to the three combined water use sectors and to account for installation of water meters for currently unmetered customers, as shown in Equation. 3.



The derivation of the savings for each component in the total savings equation is illustrated in Fig. 1 and explained in detail below.

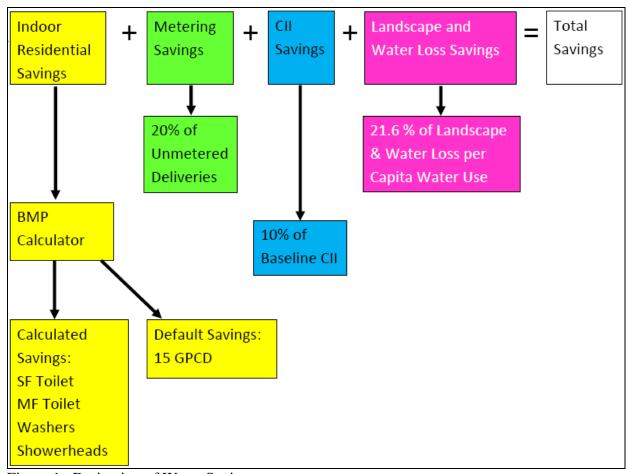


Figure 1. Derivation of Water Savings

A calculation tool, called the BMP Calculator, was developed for use in calculating several of the water savings elements shown in Fig. 1. Some of the elements in the BMP Calculator follow the procedures prescribed for BMPs in the Memorandum of Understanding of CUWCC or a modification of those procedures. The BMP Calculator was originally designed for use in other alternatives for the Target Method 4 and has more elements than are used for the draft Provisional Target Method 4. A draft BMP calculator is being released with this document along with instructions for entering data. A revised more user-friendly version of the calculator is being developed and will be released with the adopted version of Provisional Target Method 4.

## 5. Indoor Residential Savings

Indoor Residential water savings can be calculated in one of two ways: through use of the BMP Calculator or through use of a default indoor residential savings value.

<u>BMP Calculator</u> - The indoor residential savings is the sum of savings estimates from the calculator for four elements:

- Single-family housing toilets,
- Multi-family housing toilets,

- Residential washers and
- Showerheads.

The calculator uses a variety of data to estimate the saturation levels for the four categories of fixtures of various efficiencies. The saturation estimates are based on the midpoint year of the supplier's baseline. The calculator estimates how much water would be saved if the saturation for efficient fixtures was increased to reach saturation goals for 2020. The saturation goals for the four plumbing fixtures are listed below:

Single-family Toilets
Multi-family Toilets
85% 1.28 gal toilets
85% 1.28 gal toilets

• Residential Washers 85% Water Factor (WF) of 6, 15% average 2000 WF

• Residential Showerheads 95% low flow showerheads

Water suppliers that have existing high percentages of efficient fixtures will have to install fewer efficient fixtures to reach the saturation goal and will have smaller savings requirements. Based on an analysis of the random sample of water suppliers, a statewide average savings from the four indoor residential elements would be 14.1 GPCD, with a range of 7.9 to 16.8 GPCD. Most suppliers fell within the range of 13.1 to 15.1 GPCD.

<u>Default Option</u> - DWR has provided a default option for water suppliers that do not have the data to enter into the BMP Calculator or would like to get a rough estimate of their urban water use target under Target Method 4. DWR determined the default value by an analysis 1) using the BMP Calculator to calculate indoor residential savings for all suppliers in the random sample, 2) calculating the random sample average of indoor residential savings using the BMP calculator (14.1 GPCD), and 3) calculating the average of indoor residential savings for all suppliers in the random sample with a savings higher than 14.1 GPCD (resulting in 15.1 GPCD). The default is determined to be 15 GPCD.

The analysis for the proposed Provisional Target Method 4 was based on use of the BMP Calculator by all water suppliers in the random sample. As such, it is designed such that an average statewide total water savings would be 20 percent by 2020. If many suppliers choose to use the default value of 15 GPCD, it is anticipated that at least 20 percent savings would still be achieved.

#### 6. Metering Savings

Metering savings are based on the metering BMP 1.3 in the CUWCC MOU. The MOU uses an estimate that 20 percent of the water delivered to unmetered connections can be saved through metering. While the metering savings may actually occur by reductions in water use in the other water use sectors, these savings are assumed to occur in addition to the savings calculated for the other sectors. Based on experience and professional judgment of water conservation experts, the savings separately calculated for indoor residential, CII, and landscape uses and water loss reduction in this proposed procedure can be reasonably expected for fully metered communities.

## 7. CII Savings

CII savings are 10 percent of baseline CII water use. This standard is consistent with the expected goal for CII savings in BMP 4 of the CUWCC MOU and also with the CII savings component of Target Method 2 specified in Water Code section 10608.20(b)(2).

# 8. Landscape and Water Loss Savings

Landscape irrigation use and water loss savings are 21.6 percent of baseline landscape water use and water loss (see Eq. 2). The landscape and water loss savings percentage was derived from analysis of the random sample of water suppliers. The percentage was adjusted such that when landscape and water loss savings is combined with the other three savings terms, the average of the total savings was 20 percent of the random sample average baseline. The calculation is shown in Table 1.

Table 1. Calculation of Landscape and Water Loss Savings Percentage

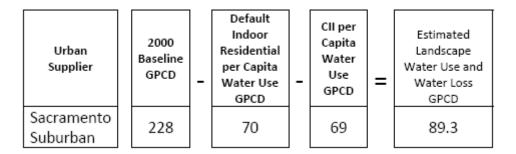
Factor	Weighted Average for Random		
		Total	
Baseline, GPCD		192.0	
Required Statewide Savings, GPCD (20% of baseline)		38.4	
Indoor Residential Savings, GPCD	14.1		
Metering Savings, GPCD	2.7		
CII Savings, GPCD	4.1		
Subtotal, GPCD		-20.9	
Additional Savings Required to Achieve 20% Statewide, GPCD		17.5	
Landscape Water Use and Water Loss, GPCD		80.9	
Landscape and Water Loss Savings Percentage		21.6	

## Sample Results Using Draft Provisional Target Method 4

Random Sample Summary. Based on the analysis of the random sample of water suppliers, the statewide weighted average base daily per capita water use was 192.0 GPCD in 2000, with a range of 101 to 395 GPCD. A 20 percent savings would be 38.4 GPCD. The range of savings resulting from the draft Provisional Target Method 4 for the 52 suppliers was 16.7 GPCD to 114.5 GPCD. The total percentage savings requirement ranged from 11.4 to 35.6. Detailed data from the random sample will be available for review in a separate document.

Sacramento Suburban Water District. To illustrate the procedures for the draft Provisional Target Method 4, calculations for Sacramento Suburban Water District are shown below. The colours correspond to Figure 1. Note that the results below are based on data that were readily available to DWR. Sacramento Suburban Water District has not reviewed these data, and the district might achieve a different result by providing more appropriate data.

Step 1. Calculation of Landscape Water Use and Water Loss



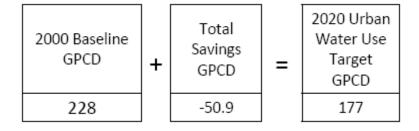
Step 2. Calculation of Savings Using BMP Calculator

Urban Supplier	Indoor Residential Option 1 - Use BMP Calculator						Metering		CII		Landscape + Water		Total
	Single Family Toilets	Multi Family Toilets	Residential Washers	Residential Showers	Total IR Savings	+	Savings BMP 1.3 +	+ BMP 4 +		=	Savings GPCD		
Sacramento													
Suburban	-7.6	-1.6	-6.0	-1.3	-16.5		-8.3		-6.9		-19.3		-50.9

Alternate Step 2. Calculation of Savings Using Default Indoor Residential Savings



Step 3. Calculation of 2020 Urban Water Use Target Using BMP Calculator



Note that because savings are calculated as a negative number in the BMP Calculator, savings are added instead of subtracted, as shown in Eq. 1.

Alternate Step 3. Calculation of 2020 Urban Water Use Target Using Default Indoor Residential Savings



## **Public Review and Comment**

A tutorial on the use of the Draft Provisional Fourth Target Method will be hosted by DWR via webinar on Tuesday, January 25<sup>th</sup>, 2011, from 10:00am until 12:00pm. The link to the webinar is https://welcome.webex.com/welcome/j.php?J=920752927

The public release of this document initiates a period of public review and comment. Comments may be in writing or presented at public workshops.

The public workshops will be held:

January 27, 2011 Metropolitan Water District of Southern California, Los Angeles January 28, 2011 Sacramento (also available via webinar)

Details are available on <u>DWR's website for SBX7-7</u>.